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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HAN, JASON

ART UNIT

PAPER NUMBER

2875

DATE MAILED: 02/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/726,882

Applicant(s)

ARIK ET AL.

Examiner

Jason M. Han

Art Unit

2875

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☒ Claim(s) 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/3/03 & 9/7/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Page 3, filed January 18, 2005, with respect to the rejection(s) of claim(s) 1-35 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the prior art.

Claim Objections

2. Claim 16 is objected to because of the following informalities: Applicant recites the limitation "around the flow path surface". There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petroski (U.S. Patent 6481874) in view of Tanuma et al. (U.S. Patent 5008582).

4. With regards to Claim 1, Petroski discloses an LED lamp assembly with heat dissipating means including:

- A housing [Figure 1: (22)];
- An LED [Figure 1: (12)] disposed in the housing; and

- A heat dissipating structure [Figure 1: (14, 16, 20, 26, 30)] in thermal communication with the LED.

Petroski does not specifically teach a fluid current generator disposed in the housing and having a piezoelectric material.

Tanuma teaches, "In an electric device having a package including-[ed] an electric circuit element therein, a cooling fan is fixed on the package directly. The fan is formed of piezoelectric elements and a flexible cooling fin. The fan generates the cooling air flow due to vibration of the piezoelectric elements [Abstract]."

It would have been obvious to modify the LED lamp assembly of Petroski to incorporate the fluid current generator/cooling fan of Tanuma in order to provide greater heat transfer from the lamp assembly and ensure conditions for efficient illumination of the light emitting diode [see Tanuma: Description of the Prior Art].

5. With regards to Claim 2, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the cooling fan including a blade [Figure 18: (21)] of flexible material, wherein the blade is spaced from a surface [Figure 18: (40)] of a heat dissipating structure [Figure 18: (11)] such that an unattached end of the blade can move in relation to the surface.

6. With regards to Claim 3, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches a pedestal [Figure 21: (28)] extending from the surface of the heat dissipating structure [Figure 21: (11)], wherein the blade is attached to the pedestal such that the blade is spaced from the surface [Figure 19].

7. With regards to Claim 4, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the pedestal having a width at least equal to the width of the blade [Figure 20].
8. With regards to Claim 5, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the pedestal preventing axial current flow between the blade and the surface at an end of the blade that attaches to the pedestal [Figure 18: obvious by disposition].
9. With regards to Claim 6, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches a piezoelectric material [Figure 5: (20)] running at least substantially the length of the blade [Figure 5: (19)].
10. With regards to Claim 7, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches a plurality of fins [Figure 25: (40)] extending from the surface of a heat dissipating structure [Figure 25: (11)].
11. With regards to Claim 8, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches a pedestal [Figure 27: (28)] extending from the surface, wherein the blade mounts to the pedestal.
12. With regards to Claim 9, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the pedestal [Figure 27: (28)] being spaced from the plurality of fins [Figure 27: (40)] to define a gap between the plurality of fins and the pedestal.
13. With regards to Claim 10, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the pedestal preventing axial

current flow between the blade and the surface at an end of the blade that attaches to the pedestal [Figure 18: obvious by disposition].

14. With regards to Claim 11, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the heat dissipating structure [Figure 1: (11)] including a cavity [Figures 25&27: between (28) and (40)] defining an opening, whereby the cooling fan includes a blade [Figures 25&27: (19)] that covers a portion of the opening.

15. With regards to Claim 12, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, the cavity being defined by an end wall that impedes axial current flow [Figures 25&27: (40)].

16. With regards to Claim 13, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, both Petroski [Figure 1: (26); Column 3, Line 17] and Tanuma [Description of the Prior Art] teach a heat dissipating structure including a printed circuit board.

17. With regards to Claim 14, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches a blade [Figure 5: (19)] having a flexible material [Figure 5: (21)] attached to a piezoelectric material [Figure 5: (20)], wherein the flexible material is substantially the same length as the piezoelectric material.

18. With regards to Claim 15, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches the heat dissipating structure

including a surface [Figure 27: left side of (28) and (40)] defining the opening and the blade mounting substantially flush with the surface.

19. With regards to Claim 16, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches a fluid current generator [Figure 10].

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petroski (U.S. Patent 6481874) in view of Tanuma (U.S. Patent 5008582) as applied to Claim 1 above, and further in view of Edelman et al. (U.S. Patent 4501319).

Petroski in view of Tanuma discloses the claimed invention as cited above, but does not specifically teach the fluid current generator having two flexible side plates connected together by a flexible hinge.

Edelman discloses a piezoelectric polymer heat exchanger having multiple flexible plates [Figure 3A: (20)] being connected by a rectangular housing/hinge [Figure 3A: (10)]. Though Edelman does not specifically state whether the housing is of a flexible material, the examiner considers the reference functionally equivalent to the limitation in providing support to the plates [Column 3, Lines 46-49]. In addition, it has been held to be within general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. In this case, a flexible housing/hinge could allow for greater vibration of the multiple plates.

It would have been obvious to modify the LED lamp assembly of Petroski with the fluid current generator/cooling fan of Tanuma to further incorporate the piezoelectric

polymer heat exchanger of Edelman in order to provide increased heat transfer efficiency, whereby multiple channels could be provided in venting cold air within and hot air out of the system [see Abstract of Edelman].

21. Claims 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petroski (U.S. Patent 6481874) in view of Tanuma (U.S. Patent 5008582) and Edelman et al. (U.S. Patent 4501319) as applied to Claim 17 above, and further in view of Edelman et al. (U.S. Patent 4406323).

With regard to Claims 18-19, Petroski in view of Tanuma and Edelman (U.S. Patent 4501319) discloses the claimed invention as cited above, but does not specifically teach the piezoelectric polymer heat exchanger having two layers of piezoelectric material (Claim 18) surrounding a flexible material (Claim 19).

Edelman (U.S. Patent 4406323) teaches a piezoelectric polymer sheet wherein the sheet includes two layers of piezoelectric material [Figure 3: (28, 30)] surrounding a flexible material [Figure 3: (32)].

It is obvious that the latter patent of Edelman (U.S. Patent 4501319) incorporates the teaching of the former (U.S. Patent 4406323). It is also obvious that by surrounding a flexible material with two layers instead of one piezoelectric layer, a greater pressure force may be exerted in creating a stronger fluid current generator. Thus, it would have been obvious to modify the LED lamp assembly of Petroski with the fluid current generator/cooling fan of Tanuma and the piezoelectric polymer heat exchanger of Edelman (U.S. Patent 4501319) to further incorporate the multiple piezoelectric layers of Edelman (U.S. Patent 4406323).

22. With regards to Claim 20, Petroski in view of Tanuma, Edelman (4501319), and further in view of Edelman (4406323) discloses the claimed invention as cited above. In addition, Edelman teaches the piezoelectric polymer sheet in an earlier patent (4406323), wherein the sheet includes two layers of piezoelectric material [Figure 3: (28, 30)] surrounding a flexible material [Figure 3: (32)].

23. With regards to Claim 21, Petroski in view of Tanuma, Edelman (4501319), and further in view of Edelman (4406323) discloses the claimed invention as cited above. In addition, Edelman (4501319) teaches the multiple flexible plates having an inner cavity wherein conduits/channels are created in providing heat transfer flow [Figures 3A-3B].

24. With regards to Claim 22, Petroski in view of Tanuma, Edelman (4501319), and further in view of Edelman (4406323) discloses the claimed invention as cited above. In addition, Edelman (4501319) teaches a cylindrical/tubular construction type of piezoelectric polymer partitions [Figures 4, 6A-6D], whereby heat transfer flows through an orifice [Figure 4: (48, 50)].

25. With regards to Claim 23, Petroski in view of Tanuma, Edelman (4501319), and further in view of Edelman (4406323) discloses the claimed invention as cited above. In addition, Edelman (4501319) teaches first and second orifices [Figures 4, 6A-6D], but does not teach the first orifice tapered. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the first orifice being tapered, since it has been held to be within the general skill of a worker that mere change of form or shape of an invention involves only routine skill in the art. *Span-Deck Inc. v. Fab-Con, Inc.* (CA 8, 1982) 215USPQ 835. In this case, tapering the first orifice

could provide a desired fluid flow, such as constriction or narrow output flow, which subsequently speeds the airflow.

26. With regards to Claim 24, Petroski in view of Tanuma, Edelman (4501319), and further in view of Edelman (4406323) discloses the claimed invention as cited above, except for the second orifice being tapered in an opposite direction to the taper of the first orifice. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the second orifice being tapered in an opposite direction than the first, since it has been held to be within the general skill of a worker that mere change of form or shape of an invention involves only routine skill in the art. *Span-Deck Inc. c. Fab-Con, Inc. (CA 8, 1982)* 215USPQ 835. In this case, tapering the second orifice could provide a desired fluid flow.

27. With regards to Claim 25, Petroski in view of Tanuma, Edelman (4501319), and further in view of Edelman (4406323) discloses the claimed invention as cited above. In addition, Petroski teaches the heat dissipating structure including a die [Figure 1: (14)] for the LED.

28. Claims 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petroski (U.S. Patent 6481874) in view of Tanuma (U.S. Patent 5008582) as applied to Claim 1 above, and further in view of Edelman et al. (U.S. Patent 4501319).

With regards to Claim 26, Petroski in view of Tanuma discloses the claimed invention as cited above. In addition, Tanuma teaches first and second fluid current generators [Figure 12: (19)], but neither specifically teaches the fluid current generators having two flexible side plates connected together by a flexible hinge.

Edelman discloses a piezoelectric polymer heat exchanger having multiple flexible plates [Figure 3A: (20)] being connected by a rectangular housing/hinge [Figure 3A: (10)]. Though Edelman does not specifically state whether the housing is of a flexible material, the examiner considers the reference functionally equivalent to the limitation in providing support to the plates [Column 3, Lines 46-49]. In addition, it has been held to be within general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. In this case, a flexible housing/hinge could allow for greater vibration of the multiple plates.

It would have been obvious to modify the LED lamp assembly of Petroski with the fluid current generator/cooling fan of Tanuma to further incorporate the piezoelectric polymer heat exchanger of Edelman in order to provide increased heat transfer efficiency, whereby multiple channels could be provided in venting cold air within and hot air out of the system [see Abstract of Edelman].

29. With regards to Claim 27, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above. In addition, Edelman teaches the multiple flexible plates having multiple inner cavities wherein a discharge conduit is created in providing heat transfer flow [Figures 3A-3B].

30. With regards to Claim 28, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above. In addition, Tanuma teaches a plurality of fins [Figure 25: (40)] extending from the surface of a heat dissipating structure [Figure 25: (11)].

31. With regards to Claim 29, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above, except for the fins radiating from a central point of the heat dissipating structure. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the fins at a central point of the structure, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70. In this case, rearranging the fins may affect convection and the airflow to a desired preference.

32. With regards to Claim 30, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above. In addition, Tanuma teaches a fluid current generator/cooling fan [Figure 3: (19)] being disposed about a central point of the heat dissipating structure [Figure 3: (11)].

33. With regards to Claim 31, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above. In addition, Edelman teaches a fluid current generator with a plurality of openings [Figures 3A-3B].

34. With regards to Claim 32, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above. In addition, Edelman teaches a fluid current generator [Figures 3A-3B] including a first plate, a second plate, and a flexible hinge/housing (as cited above) attaching the first and second plates, wherein the flexible hinge includes a plurality of openings.

35. With regards to Claim 33, Petroski in view of Tanuma, and further in view of Edelman discloses the claimed invention as cited above. In addition, Edelman teaches

multiple flexible plates creating a plurality of openings defined for current flow [Figures 3A-3B]. It should be noted that the above reference is functionally equivalent in providing fluid flow in different/opposite directions. Lastly, it also would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate multiple hinges, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

36. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petroski (U.S. Patent 6481874) in view of Glezer et al. (U.S. Patent 6588497).

Petroski discloses an LED lamp assembly with heat dissipating means including:

- A housing [Figure 1: (22)];
- An LED [Figure 1: (12)] disposed in the housing; and
- A heat dissipating structure [Figure 1: (14, 16, 20, 26, 30)] in thermal communication with the LED.

Petroski does not specifically teach a synthetic jet actuator in the housing.

Glezer teaches a thermal management system utilizing a synthetic jet actuator for cooling the system [Abstract].

It would have been obvious to modify the LED lamp assembly of Petroski to incorporate the synthetic jet actuator of Glezer in order to provide a cooling means for the lamp without the use of a fan. To quote Glezer, "Traditionally, the need for cooling microelectronic devices has been met by using forced convective cooling with or without heat sink devices. Forced convection is effected using fans which provide either global

overall cooling or locally-based cooling... Use of a fan also requires relatively large moving parts in order to have any success in cooling a heated body or microelectric component. These large moving parts naturally require high power inputs [Column 1, Lines 39-49]."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following references are cited to further show the state of the art pertinent to the current application, but are not considered exhaustive:

US Patent 4498851 to Kolm et al;

US Patent 4595338 to Kolm et al;

US Patent 4780062 to Yamada et al;

US Patent 4923000 to Nelson;

US Patent 5861703 to Losinski;

US Patent 5921757 to Tsutsui et al;

US Patent 6045240 to Hochstein;


US Patent 6517221 to Xie.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Han whose telephone number is (571) 272-2207. The examiner can normally be reached on 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (571) 272-2378. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMH (2/17/2005)



JOHN ANTHONY WARD
PRIMARY EXAMINER